Abstract

Methods for removing sulfur from syngas in a Fischer-Tropsch reactor, and reactors including means for removing sulfur from syngas are disclosed. Sulfur-reactive metals can be used in the Fischer-Tropsch unit to sequester the sulfur. For example, the Fischer-Tropsch unit can be run in stages, using a sacrificial catalyst in a first stage to adsorb the sulfur. The Fischer-Tropsch reactor can include internal baffles that separate the reactor into zones, with a sacrificial catalyst in one or more of the zones, that can be easily sequestered and regenerated or replaced. Sulfur adsorbents can be placed in the inlet gas manifold. A portion of the Fischer-Tropsch catalyst can be converted into larger size pellets that do not fluidize with the finer grain Fischer-Tropsch catalyst and remain near the gas inlet where they adsorb and sequester the sulfur. These embodiments can be combined in any suitable manner to lower the sulfur concentration in the syngas feed. The resulting syngas feed preferably has a sulfur concentration less than 50 wppb, more preferably less than 15 wppb, and most preferably less than 1 wppb.